

Claims

1. A refrigeration system of an air conditioning apparatus to cool or heat air within a space by using phase change of refrigerant, the refrigeration system comprising:

- 5 an expansion unit to execute adiabatic expansion of refrigerant;
 an indoor unit with a heat exchanger;
 a compressor to execute adiabatic compression of the refrigerant;
 an outdoor unit with a heat exchanger; and
 a bypass line connected between an inlet and an outlet of the compressor
10 to bypass at least a part of the refrigerant discharged from the outlet of the compressor to the inlet of the compressor, when a pressure of the discharged refrigerant is lower than a preset level or the temperature of outside air of the compressor is lower than a preset level.

2. The refrigeration system of an air conditioning apparatus as set forth
15 in claim 1, wherein refrigerant is condensed in the indoor unit or the outdoor unit is introduced into the expansion unit through at least one auxiliary evaporator for heat exchange, and a part of the refrigerant to be introduced into the expansion unit is expanded in at least one auxiliary expansion unit under the adiabatic condition, and supplied to the compressor through the auxiliary evaporator for
20 heat exchange.

3. The refrigeration system of an air conditioning apparatus as set forth in claim 2, wherein the at least one auxiliary evaporator for heat exchange is comprised of a plurality of auxiliary evaporators which are connected to each other in series or in parallel with respect to the flow of the refrigerant.

- 25 4. The refrigeration system of an air conditioning apparatus as set forth in claim 2, wherein the at least one auxiliary expansion unit is comprised of a plurality of auxiliary expansion units which are connected to each other in series

or in parallel with respect to the flow of the refrigerant.

5 5. The refrigeration system of an air conditioning apparatus as set forth
in claim 1, wherein refrigerant condensed in the indoor unit or the outdoor unit is
introduced into the expansion unit through at least one auxiliary evaporator for
heat exchange, in which a part of the refrigerant to be introduced into the
expansion unit is expanded in at least one auxiliary expansion unit under the
adiabatic condition, and the refrigerant discharged from the at least one auxiliary
expansion unit is mixed with the refrigerant evaporated in the outdoor or the
indoor, and supplied to the compressor through the at least one auxiliary
10 evaporator.

6. The refrigeration system of an air conditioning apparatus as set forth
in claim 5, wherein the at least one auxiliary evaporator for heat exchange is
comprised of a plurality of auxiliary evaporators which are connected to each
other in series or in parallel with respect to the flow of the refrigerant.

15 7. The refrigeration system of an air conditioning apparatus as set forth
in claim 5, wherein the at least one auxiliary expansion unit is comprised of a
plurality of auxiliary expansion units which are connected to each other in series
or in parallel with respect to the flow of the refrigerant.

20 8. The refrigeration system of an air conditioning apparatus as set forth
in claim 1, wherein refrigerant condensed in the indoor unit or the outdoor unit is
introduced into the expansion unit through at least one auxiliary evaporator for
heat exchange, in which a part of the refrigerant to be introduced into the
expansion unit is expanded in at least one auxiliary expansion unit under the
adiabatic condition, and the refrigerant discharged from the at least one auxiliary
expansion unit and subjected to heat exchange in the at least one auxiliary
25 evaporators is mixed with the refrigerant evaporated in the outdoor or the indoor
and subjected to heat exchange in the expansion unit, and supplied to the

compressor.

9. The refrigeration system of an air conditioning apparatus as set forth in claim 8, wherein the at least one auxiliary evaporator for heat exchange is comprised of a plurality of auxiliary evaporators which are connected to each other in series or in parallel with respect to the flow of the refrigerant.

10. The refrigeration system of an air conditioning apparatus as set forth in claim 8, wherein the at least one auxiliary expansion unit is comprised of a plurality of auxiliary expansion units which are connected to each other in series or in parallel with respect to the flow of the refrigerant.

11. The refrigeration system of an air conditioning apparatus as set forth in claim 1, wherein refrigerant condensed in the indoor unit or the outdoor unit is introduced into the expansion unit through at least one auxiliary evaporator for heat exchange, in which a part of the refrigerant to be introduced into the expansion unit is expanded in at least one auxiliary expansion unit under the adiabatic condition, and the refrigerant discharged from the at least one auxiliary expansion unit is mixed with the refrigerant evaporated in the outdoor or the indoor and subjected to heat exchange in the expansion unit, and supplied to the compressor.

12. The refrigeration system of an air conditioning apparatus as set forth in claim 11, wherein the at least one auxiliary evaporator for heat exchange is comprised of a plurality of auxiliary evaporators which are connected to each other in series or in parallel with respect to the flow of the refrigerant.

13. The refrigeration system of an air conditioning apparatus as set forth in claim 11, wherein the at least one auxiliary expansion unit is comprised of a plurality of auxiliary expansion units which are connected to each other in series or in parallel with respect to the flow of the refrigerant.